(For a literature review the general population trends of marine mammal species relevant to our proposed aerial and vessel survey research, please see attached file: P14451T7_STATUS OF POTENTIALLY AFFECTED SPECIES BY OCEAN BASIN.pdf)

ACTIVE SONAR AND MARINE MAMMALS: LITERATURE REVIEW

The sensory capabilities of marine mammals have adapted over millions of years to exploit the enhanced properties of sound propagation in water. They rely on sound for a variety of functions including detection of predators, detection of prey, orientation, navigation, and communication with conspecifics (Tyack and Clark, 2000). Considerable attention has been focused over the past decade on the potential for harm to marine mammals from exposure to human-made noise. The accumulated body of literature reveals a variety of responses, ranging from subtle changes in dive patterns (Frankel and Clark, 2000; Costa *et al.*, 2003), to clear avoidance responses (Malme *et al.*, 1983; 1984; 1985; cf: Mobley, 2005) to mass beachings and death (Frantzis, 1998; Balcomb and Claridge, 2001). The extent of effects varies depending on the type, frequency, and intensity of the signal, the duration of exposure, whether the source is fixed or moving, and the species involved, among other variables (see the review in Richardson *et al.*, 1995; NRC, 1994, 2000, 2003, 2004).

Thus non-combat tests of military sonar are regulated under the Marine Mammal Protection Act (MMPA), Endangered Species Act (ESA), National Marine Sanctuaries Act (NMSA) and other state and federal statutes due to concerns that active military sonars may be associated with historic mass strandings of cetaceans particularly beaked whales (e.g., D'Spain, D'Amico & Fromm,
2006) as well as possibly other species (Southall et al. 2006; NMFS,2005; Norman et al., 2004).

The deployment of low frequency active sonar (LFAS) and the use of medium frequency active sonar (MFAS) by the U.S. Navy with respect to their potential impacts on marine mammals has therefore been an ongoing issue scientific and regulatory interest, as well as public concern. Strandings of marine mammals, including mass strandings, may occur for a variety of reasons including parasitism, disease, strong social bonds with a moribund conspecific or calf, injury due to predation or fisheries interactions, ice entrapment, biotoxins, or oil spills, and because mass strandings have greatly increased in frequency since the 1980s, anthropogenic causes may be responsible for some of the increase (Perrin & Geraci, 2002). Since the 1990s, several high profile mass stranding events, particularly involving various beaked whale species, have been associated with the use of military active sonars (Frantzis, 2004; Balcomb & Claridge, 2001; NMFS, 2005; see reviews: Cox et al, 2006; Buck & Calvert, 2008). Since the sequence of these strandings began, a series of regulatory actions between various political bodies such as NMFS, the Navy, and the Marine Mammal Commission (MMC) were initiated in response to the possibility that marine mammals were harmed by both LFA and MFA sonar (Buck &

Calvert, 2008). In 2003, Congress directed the MMC to fund international conferences on acoustic threats to marine mammals, and in December of the same year the MMC appointed the Advisory Committee on the Acoustic Impacts on Marine Mammals. Also several federal lawsuits by Natural Resources Defense Council and the California Coastal Commission were filed in efforts to block the use of these sonars in specific domains such as training in specific areas or exercises, as well as during deployment (Buck & Calvert, 2008). Both domestically and internationally, there are growing calls to study and mitigate the effects of active sonar on marine mammals (Dolman et al., 2009; Parsons et al, 2008; Fortescue et al., 2005). In 2006, the settlement of the RIMPAC case mandated the use of aerial surveillance for marine mammals during exercises, among other mitigating actions.

Because the biology and behavior of beaked whale species are poorly understood relative to those of more common species such as the bottlenosed dolphin, and because the response of beaked whales as well as marine mammals in general to anthropogenic sounds is also poorly understood, more research would better help to craft policies to mitigate the effects of active sonars on marine mammals (Southall et al., 2007; Tyack, 2003-4).

The purpose of the present proposal is to seek a permit to continue participation in the Navy's marine mammal monitoring program. Marine Mammal Research Consultants (MMRC) has carried out regular surveys of US Naval ranges and operations areas (OPS AREAS) since 2002. Over the past seven years, our involvement has expanded from a focus on the Hawaiian Range Complex (HRC) (e.g., Mobley, 2006, 2008) to other ranges including the Southern California Range Complex (SOCAL) (Smultea, Mobley & Lomac-MacNair, 2008), Marianas Islands (Mobley, 2007) and the Bahamas (AUTEC) (Mobley, 2004). The request for the broad array of US regions included here represents a logical extension of this ongoing program of research.

References: See attached file *P14451T12*_PERMIT-REFERENCES.pdf